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Entoloma mastoideum and *E. praegracile* — two new species from China

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Abstract — Two new *Entoloma* species, *E. mastoideum* and *E. praegracile* from China, are described, illustrated, and compared with similar taxa. *Entoloma mastoideum* is characterized by its flesh-colored or pinkish pileus with a distinctive conic to umbonate papilla, 6–8-angled spores, (1–)2-spored basidia, cylindrical to clavate and hyaline cheilocystidia. *Entoloma praegracile* is distinctive because of its small and pale orange basidiomata, translucently striate pileus, slender and brittle stipe, (1–)2–3-spored and short and stout basidia, and absence of cheilocystidia.

Key words — *Entolomataceae*, new taxa, taxonomy

Introduction

Entoloma (Fr.) P. Kumm. is very species-rich and widespread from the arctic to tropical areas (Gates & Noordeloos 2007, Horak 1980, 2008, Noordeloos 2004). More than 1000 species of the genus have been described worldwide (Kirk et al. 2008). In most *Entoloma* species the basidia are tetrasporic, and only a few species whose basidia consistently bear 2 sterigmata have been reported (Hesler & Smith 1963, Hesler 1967, Hongo 1957, Horak 1980, Noordeloos 1992, Romagnesi & Gilles 1979).

In a survey of *Entoloma* in China, two noteworthy species with bisporic basidia were discovered. They differ morphologically from any known species, and therefore are described as new to science with detailed descriptions and illustrations.

Materials & methods

Entoloma mastoideum was collected from Ehuangzhang Reserve in southwest Guangdong Province. Ehuangzhang Reserve is a tropical rain forest, and the altitude

mainly ranged from 600 to 800 m. *E. praegracile* was from Fanjing Mountain in Guizhou Province. Fanjing Mountain is located between subtropical and temperate China, at an elevation about 2500 m.

Fresh collections were photographed, and described with colour notations according to Kornerup & Wanscher (1978). Macroscopic descriptions are based on the fresh basidiomata and original records of the collections. Spores, basidia and cystidia were observed in 5% KOH or 1% Congo Red. The pileipellis was examined in 5% KOH. Spore dimensions are based on the measurements of 15 basidiospores made in lateral (profile) view, excluding the hilar appendix or apiculus. Spore length to width ratios are reported as Q.

The dried studied specimens are deposited in the Fungal Herbarium of Guangdong Institute of Microbiology (GDGM) and the Herbarium of Cryptogams, Kunming Institute of Botany, Chinese Academy of Sciences (KUN, with HKAS numbers).

Taxonomy

Entoloma mastoideum T.H. Li & Xiao Lan He, **sp. nov.** Figs 1, 2

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Pileus 2.5–7 cm latus, conicus vel applanatus cum papilla, carneus vel pallide roseolus, striatellus, glaber vel aliquantum fibrillosus, nimie marginatus. Lamellae subliberae vel adnatae, albidae vel roseolae. Stipes 35–90 × 3–8 mm, albus, eburneus vel leviter flavidus, politus. Sporae 9.5–12(–13) × 7–8(–8.8) µm, 6–8-angulatae, pallide roseolae. Basidia bispora, interdum monospora. Cheilocystidia 16–30 × 3.5–8 µm. Pileipellis cutis hyphis cylindraceis, 5–15 µm latis. Fibulae absens.

Type: China. Guangdong Province, Yangchun County, Ehuangzhang Nature Reserve, 21 April 2010, Li Tai-Hui, Huang Hao & Lin Qun-Ying (GDGM 26597, **Holotype**).

Etymology: *mastoideum*, refers to the pileus with pronounced conic to umbonate papilla.

Macrocharacters — Pileus 2.5–7 cm broad, conical when young, expanding with pronounced conic to umbonate papilla, never depressed, slightly hygrophanous, slightly translucently striate almost to center or nearly estriate, flesh-colored or pinkish to pale pinkish brown (9A2–9A3, 11A2–11A3), slightly paler towards margin, glabrous to slightly innately radially fibrillose, with membranous margin exceeding gills. Lamellae subfree to adnexed, subventricose, moderately crowded, white turning pinkish, up to 5 mm deep, edge concolorous and even. Lamellulae present, 3–4 tiers. Stipe central, cylindrical, paler than pileus, white, ivory to yellowish, usually subtransparent, 35–90 × 3–8 mm, hollow, fragile. Context thin, whitish. Odour foetid, taste not distinctive.

Microcharacters — Basidiospores 9.5–12(–13) × 7–8(–8.8) µm, 6–8-angled with irregular pronounced angles in side-view, thick-walled, Q = 1.3–1.6, heterodiametrical. Basidia clavate, 2-spored, sometimes 1-spored, 25–34 × 9–11.5 µm. Lamellar trama regular. Lamella edge sterile. Cheilocystidia in clusters, terminal cells cylindrical to narrowly clavate, rarely fusoid, 16–40

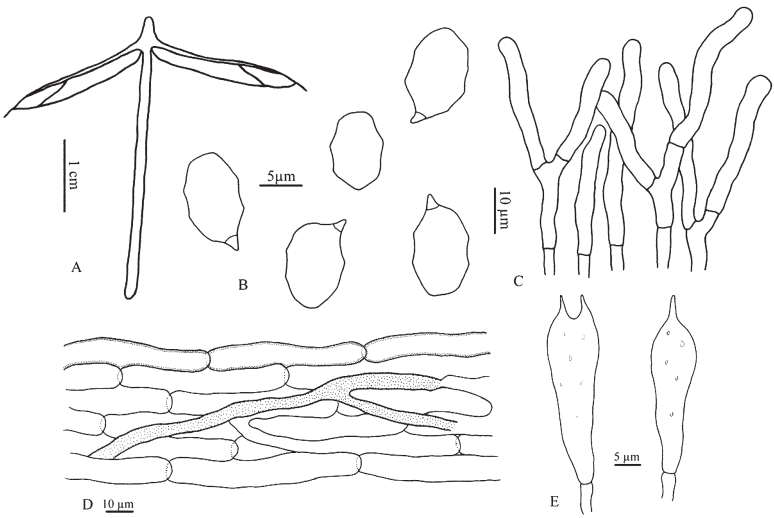

Fig. 1. *Entoloma mastoideum* (drawn from the holotype).
A: Longitudinal section. B: Spores. C: Cheilocystidia. D: Pileipellis. E: Basidia.

× 3.5–8 μm, without pigment. Pleurocystidia absent. Pileipellis a cutis of repent hyphae (5–15 μm diam.), with yellow internally encrusting pigment. Oleiferous hyphae numerous. Clamp connections absent.

Habitat: Scattered to caespitose, on sandy loamy soil in broadleaf forest.

Additional material examined: **China. Guangdong Province**, Yangchun County, Ehuangzhang Nature Reserve, 22 April 2010, Li Tai-Hui, Lin Qun-Ying & Huang Hao, GDGM 27639; 23 April 2010, Li Tai-Hui, Lin Qun-Ying & Huang Hao, GDGM 27640.

Comments: *Entoloma mastoideum* is distinctive in its combination of the following characters: flesh-colored or pinkish pileus with an obvious conic to umbonate papilla, distinct membranous margin exceeding gills, mostly 2-spored basidia, 6–8-angled spores measuring 9.5–12(–13) × 7–8(–8.8) μm, and abundant cheilocystidia.

Macroscopically, *Entoloma mastoideum* is very close to *E. lilacinoroseum* Bon & Guinb. (Noordeloos 1992), originally described from Europe. However, *E. lilacinoroseum* can be easily distinguished by its tetrasporic basidia, lecythiform to tibiiform cheilocystidia, and smaller spores (6.5–10 × 5–7 μm).

Entoloma bisporigerum (P.D. Orton) Noordel., *E. bisporiferum* (Romagn. & Gilles) Noordel. & Co-David, *E. bisporum* (Hongo) Hongo, and *E. commune* Murrill are similar to the new species in that their basidia also bear 2 sterigmata, but they are easily differentiated from *E. mastoideum* morphologically. *Entoloma*

Fig. 2. *Entoloma mastoideum.* A, B: Basidiomata.

bisporigerum is characterized by an umbilicate and brown pileus, larger spores (10–12(–13) × (7.0–)8.0–9.5(–10.5) µm), and absence of cheilocystidia (Noordeloos 1992); *E. bisporiferum* has a plane to slightly depressed pileus without papilla; *E. bisporum* possesses a delicate and pale yellow-brown pileus (8–15 mm across; Hongo 1957), smaller spores (8.5–9.5(–10) × 6–6.5(–7) µm; the size is based on the re-examination of the holotype), and lacks cheilocystidia; and *E. commune* has an avellaneous pileus and much smaller spores (8–9 × 6.5–7.5 µm; Hesler 1967).

Entoloma praegracile Xiao Lan He & T.H. Li, **sp. nov.** Fig. 3

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Pileus 8-10 mm latus, leviter flavidus vel dilute luteoaurantius, convexus vel planus, hygrophanus translucidostriatus. Lamellae adnatae, leviter flavidus vel rosae acie concolor. Stipes 45–50 × 1–1.5 mm pileo concolor. Sporae (8–)9–10.5 × 6.5–8(–8.5) µm, 5–6(–7)-angulatae. Basidia 23–35 × 10–12.5 µm, bispora vel trispora. Acies lamellarum fertilis.

Type: China. Guizhou Province, Jiangkou County, Fanjing Mountain, 11 August 2006, Wang Xiang-Hua 2003 (HKAS 51726, **Holotype**).

Etymology: *praegracile*, refers to the slender and fragile stipes.

Macrocharacters — Pileus 8–10 mm broad, convex becoming plane, slightly depressed in center or not, wax-yellowish, pinkish wax-yellow or pale orange-yellow (5A2–5A3), translucently striate almost to center, hygrophanous, smooth, dries orange-red. Lamellae adnate, with short decurrent tooth, ventricose, moderately distant, white to pinkish, up to 1 mm deep, edge concolorous and entire. Lamellulae present, 1–2 tiers. Stipe central, 40–50 × 1–1.5 mm, cylindrical, orange-yellow (5A2–5A4), concolorous with or deeper than pileus, smooth, hollow, slender, fragile, with white basal tomentum or fibrils. Context thin, concolorous with pileus. Odour not distinct. Taste not distinct.

Microcharacters — Basidiospores (8–)9–10.5 × 6.5–8(–8.5) µm, 5–6(–7)-angled, sometimes with obtuse angles, relatively thin-walled, Q = 1.2–1.4,

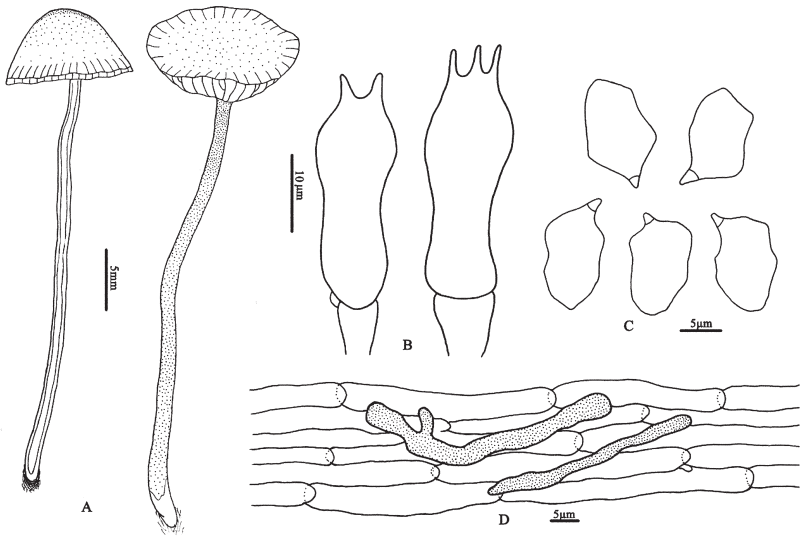

Fig. 3. *Entoloma praegracile* (drawn from the holotype).
A: Basidiomata. B: Basidia. C: Spores. D: Pileipellis.

heterodiametrical. Basidia subclavate, more or less foot-shaped, stout, 23–35 × 10–12.5 μm, 2–3-spored, sometimes monosporic, rarely clamped. Lamella edge fertile. Cheilo- and pleurocystidia absent. Pileipellis an ixocutis of repent interwoven hyphae (3–8 μm in diam.), with very pale yellow diffuse pigment or nearly colorless. Oleiferous hyphae present in pileipellis. Clamp connections present but rare.

Habitat: Scattered, on soil in broadleaf forest.

Comments: *Entoloma praegracile* is characterized by the small basidiomata, translucently striate pileus, orange stipe, stout and mostly 2–3-spored basidia, absence of cheilocystidia, heterodiametrical and relatively thin-walled spores. The dried specimens have orange-red colored pilei and stipes.

Several *Entoloma* species with orange basidiomata have been described from Asia (Hesler 1967, Horak 1980, 1986), including *E. aurantipes* E. Horak, *E. croceum* E. Horak, *E. kobayasianum* E. Horak, *E. quadratum* (Berk. & M.A. Curtis) E. Horak, and *E. roseum* (Longyear) Hesler. Comparatively, however, *E. aurantipes* differs due to the brown squamules over the pale orange pileus and the distinct cheilocystidia; *E. croceum*, originally described from New Zealand, can be easily differentiated by the umbilicate and orange pileus, decurrent lamellae, and conspicuous clavate cheilocystidia; *E. kobayasianum*, originally described from Japan, differs in its umbilicate pileus, smaller spores (7–8.5 × 4.5–5 μm), and cylindrical to clavate cheilocystidia; *E. quadratum* can be

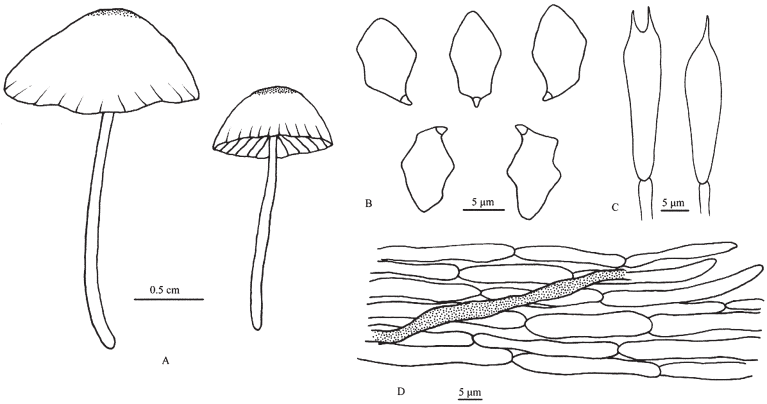

Fig. 4. *Entoloma bisporum* (drawn from the holotype).
A: Basidiomata. B: Spores. C: Basidia. D: Pileipellis.

readily distinguished from *E. praegracile* by its quadrate spores; and *E. roseum* is obviously different because of its squamulose pileus combined with adnate to subdecurrent, fimbriate lamellae and predominantly fusoid cheilocystidia. In addition, the basidia of these five species are tetrasporic.

Entoloma bisporum is very close to *E. praegracile* in that they both have small basidiomata and 2-spored basidia. According to Hongo's descriptions, *E. bisporum* has a pale yellow-brown pileus with a deeper colored center, and a relatively short stipe (1.5–2 cm long) that is paler than or concolorous with the pileal surface. The authors studied the holotype and the paratype of *E. bisporum* deposited in the National Museum of Nature and Science Herbarium, Japan (TNS-F-237496, TNS-F-237497). The dried specimens have pale brownish gray to pale yellow-brown colored pilei with deeper centers. Microscopically, the cheilocystidia are absent, the basidia of the two specimens are typically clavate and consistently in the range 30–40 × 6–8 μm, and the spores are slightly narrower (8.5–9.5(–10) × (5.5–)6–6.5(–7) μm; Fig. 4). In addition, no clamp connections were observed in the two specimens.

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